

Chapter 10

The Little Red Worcester And The YAG

How on earth did I get in the situation of holding on to a handhold in a shuddering Navy helicopter while directing a cameraman's shots of a pinkish-grey Navy cruiser almost immediately below us? It all began a couple of years before as the result of our decontamination experiments at NRDL. While half my crew in the Engineering Applications Branch were busily engaged in writing chapters for *Radiological Defense, Volume II*, Johnny Howell and Dick Soulé were leading the attack on the problem of radiological decontamination at sea—how to deal with what happened after the underwater burst at Operation Crossroads.

In the beginning, we focused on trying to decontaminate surfaces on the *Independence* using chemical additives to seawater because mechanical scrubbing and blasting with sand, corn cobs and the like had been tried at Bikini and at several shipyards. Removal of a layer of paint did the job but nothing else did. Removing a layer of paint at sea was not practical so we tried additives to seawater, which was abundant. Hosing down with seawater alone did nothing once the fallout had dried, so we added surfactants and sequestering agents that were known to be effective in removing soil and stains in the cleaning industry. Some of these were household words, such as Tide and Soilax. These contained TSP, trisodium phosphate, now banned from ordinary use. Another additive was EDTA, ethylenediaminetetraacetic acid, which now is a popular alternative cancer medicine for flushing heavy metals out of the body, a process called chelation therapy. In our case, nothing we tried was effective for decontamination at sea. Once the liquid fallout from an atomic burst had dried, it was locked in the paint.

On board the *Independence*, Johnny Howell and his crew had built an experimental device in which foot-square plates of steel, painted and unpainted, could be contaminated with tracer quantities of radioactivity and then subjected to various cleaning methods. The equipment was modified so we could flow water over the surface while spraying simulated fallout on the test samples. Initially, we tried to maintain a smooth laminar flow of seawater to intercept the fallout but gradually we established that that condition was unnecessary. All we had to do was wash off the paint before the contaminant had dried.

Washing down a whole ship was easier said than done. It could not be done with fire hoses because the unprotected crew would be incapacitated or killed by the high levels of radiation existing during the fallout event. Our sponsor within the Bureau of Ships was the Ship Protection Section in my old stomping grounds, the Preliminary Design Branch. In particular, my contact was Woody Armstrong. He had been joined by another senior engineer, Mike Kearns. Kearns was a bluff Irishman who saved his talk for when it was needed. Woody, on the other hand, was the loquacious one with a ready collection of anecdotes to tell. These two gentlemen entered fully into our experimental program even though most of the time we were 3000 miles apart. It was during one of our routine discussions of progress that the idea of automatically washing down the ship took hold.

Mike Kearns was a prime mover in the conceptual development of the shipboard washdown system. The first impediment to progress was the firehose analogy. It wasn't until we abandoned

the automated firehose idea and turned to the rainstorm analogy that a practical system began to emerge. The topsides of a ship are designed to readily drain rainstorms and sea spray in heavy weather. What we needed to do was create a rainstorm on demand. The ship's seawater pumps could deliver enough water. The spray devices could be similar to those used to sprinkle lawns. In fact, lawn sprinklers were used initially in our experimental chamber. They worked great. But now we would need full-scale tests at sea.

With characteristic determination, Mike Kearns and Woody Armstrong put together the first full-scale washdown test. It was done in the summer of 1951 on the *USS Dortch*, a Fletcher-class destroyer, off Charleston SC. You have no idea what it took to stage one of these experiments. First, you had to convince the admirals in the Bureau of Ships that it is necessary and important. Then, they had to ask the Chief of Naval Operations for the ship or ships and other resources needed and convince his staff that it is necessary and important. It was a measure of the Navy's concern for radiological defense that these requests were rarely turned down.

Mike Kearns called this one *Operation Shower Bath*. It was not very successful. I did not participate but I got a blow-by-blow report from Woody. The main problem was that Mike had chosen rotating sprinklers to be installed topsides on the *Dortch* at Charleston Naval Shipyard. Some were mounted horizontally and some vertically like pinwheel fireworks. They didn't bathe the ship in water like a rainstorm would and an awful lot of the water was sprayed overboard. To simulate fallout, Mike had members of the crew paint the topside with red poster paint, the main characteristic of which was that it could be washed off. In the postmortem, we suggested the use of sprinkler heads of the type used for fire protection. These had the right spray characteristics and were a standard Navy item in ship compartments for fire protection. We also proposed the use of fog generators and a dye called "acid fuchsin" to simulate the fallout. This stuff was red and would not wash off easily if it were allowed to dry. In retrospect, we should have proposed bombing the ship with a dye-laden tank of water as you have probably seen done on the TV news to control forest fires, but the fog generators worked well the next time around.

Dinner at Ewings

We helped design the next full-scale test, which took place in the spring of 1952. This time, Mike Kearns had obtained the light cruiser *Worcester* (pronounced Wooster) to be the guinea pig. Again, the Charleston Naval Shipyard had the job of installing the second-generation washdown system. It was early April when several of my staff and I went to Washington for the final planning session before the test.

At this time, the Ship Protection Section of Preliminary Design had a new Officer-in-Charge, LCDR Frederick Ewing, Jr. Ewing was a short, wiry guy in a wrinkled uniform who seemed thoroughly satisfied to rely utterly on Mike Kearns and Woody Armstrong in this matter. And, he seemed very impressed by the team from NRDL. After one planning session, Ewing took me aside and invited me to his home in the Maryland countryside for dinner. He was an expert in the making of spaghetti sauce, he said, and that was the menu for the evening. Having nothing else to do, I accepted. Later, I mentioned to Mike and Woody that Fred Ewing had invited me to dinner. "You didn't accept, did you?" asked Mike. When I nodded yes, both friends rolled their eyes and said, "Lotsa luck!"

What I didn't know at the time was that Freddie Ewing was a certifiable nutcase, an alcoholic, and prone to disappear for days at a time. The reason his uniform was wrinkled was that he probably slept in it more often than not. But I didn't know all this when Freddie loaded me into his car and left the city. It must have been somewhere near Olney when he made a left turn from the two-lane country road into a rutted car track and drove up a weedy hill toward a weird-looking house. Freddie explained that the original owner of this acreage was a rich man who planned a big manor house but only got the garage built before he died. It was a three-car garage with quarters for the chauffeur above. Freddie had filled in walls where the garage doors should be. I noticed that the siding in one door area did not match the others. There was an entrance door near one side. Inside there was a small foyer with stairs leading up to the second floor. I noticed that the trim on one side of the stairs did not match the trim on the other. As a matter of fact, the trim changed about half way up.

"Did you renovate this building yourself, Fred?" I asked. "Yes," he replied, "I've been working on it for over a year." "That," he continued, pointing to a large brown spot on the living room rug, "was where the bitch had puppies." I didn't see the dog or any family either. He conducted me to the rear of the house and into the kitchen. He made straight for the refrigerator and pulled out two cans of beer. There seemed to be mostly beer in the fridge. "Have a beer," he said, popping one. In one long swig, Fred emptied the beer can and threw it out the kitchen window, which happened to be open. The can clunked on other cans. Later I took a look and there was a huge mound of beer cans below that window. There must have been several hundred empties there.

Also on the kitchen window ledge in the afternoon sun was an open package of hamburger meat. Fred waved some flies off the ground meat and took it to the kitchen table. "Americans don't know how to eat beef," announced Fred. "The British, now, do know how. I was stationed in London and got educated. They don't go for this aging in cold storage and refrigeration and all that. They age the meat at room temperature and it tastes better." I should have been warned by that culinary lecture as Fred browned the beef but I wasn't. Later, as the spaghetti sauce simmered, I had another beer and Fred had five or six. Still later, Fred's wife and young son came downstairs and we sat down to the meal. Fred loaded my plate with spaghetti and his special sauce. I kept getting this bad smell, which I attributed to the spot on the rug. Finally, all were served and it was time to dig in. I took a forkful and held it in my mouth. My taste buds and nose told me I was eating putrefied meat. With a great effort, I swallowed. At that moment, Fred Ewing asked me the only question he could ask that I could answer truthfully without insulting him. "Have you ever tasted spaghetti sauce like this before?" "No," I answered, "I can't say that I have."

Little Red Worcester

We took a commercial flight down to Charleston. A Navy bus met us and took us directly to the docks where we boarded the *Worcester*. After being assigned to rooms in officer country, we inspected the new washdown installation before the evening meal. It was then that I noticed that Fred Ewing was not with us. "Oh, he was met at the airport by one of his Annapolis buddies," said Mike. "He knows we leave at 0800 tomorrow. He'll show up." After dinner, the wardroom was cleared and we briefed the skipper and his officers on just what we planned to do. "Will that red dye come off?" asked the skipper. "It will if we get to it before it dries," I answered. "I hope you guys know what you doing," growled the CO.

The next morning, after a good Navy breakfast, we were ready to go. We were to rendezvous with a couple of destroyer escorts and take aboard a helicopter off Guantanamo Bay, Cuba, and conduct what Mike Kearns had dubbed "Experiment Washdown" the next day. As the clock came up on 0800 I noticed the CO gesticulating as he said something to Mike Kearns. Mike pointed down the pier. A man in a rumpled khaki officer's uniform came jogging toward the gangway. I recognized Freddie Ewing. As he came aboard, looking like he had slept in his uniform (and probably had), the crew cast off the last lines and we got underway.

I had brought a full crew with me to operate the fog generators and score the performance of the washdown system. We would place a half dozen generators up near the bow both on the deck and on a crane so that the movement of the ship through the water would aid in bathing it with the acid fuchsin dye mixed with seawater. Everyone had a job and mine was to ride the helicopter with a photographer and make sure a good visual record of the experiment was obtained.

The next morning we picked up the escorts. The *Worcester* normally would not carry a helicopter so a temporary landing pad had been installed aft of the after 6-inch gun turret near the fantail. Thing was, however, that a couple of sprinklers were necessary in that area to wash down the turret and fantail adequately. To solve that problem, the sprinklers were made movable and were installed on the landing pad after we had taken off in the helicopter. After the helicopter arrived from Guantanamo, we did a trial run of the experiment—everything but fogging the ship with dye. The helicopter was a four-seater with sliding doors on either side. There were three of us on board, the pilot up front, the photographer next to the port door and me alongside the photographer.

Everything worked fine during the trial run. We took off and after they had the washdown system in place it was turned on. I almost gasped at the result. It looked like the ship was covered with cotton like a fuzzball. We opened the port door so the photographer could take pictures and cruised up one side and down the other at a little above mast height. As we circled the stern of the *Worcester* in its cocoon of water spray, I was struck by the jets of water running out of the scuppers into the sea. They looked like hose nozzles under pressure and there were a dozen on each side of the ship. That was a lot of water being sprayed.

After lunch, we got ready for the test itself. After a last minute conference, the pilot, photographer, and I boarded the helicopter and took off. We hovered off the stern until the

washdown system was turned on and then moved up the starboard (that's the right-hand, dear) side of the ship about 50 yards off and above mast height. When the fog generators went into action, I had the photographer start taking pictures. The spray cocoon around the ship began to turn pink and then reddish. To us in the helicopter, the effect was spectacular. I was told later that the effect also was spectacular on board our two escorts. One signaled, "Fuchsia becomes you, dear" and the other "Sail on, O Little Red Worcester!"

As we circled the bow of the ship and moved down the port side, I noticed that the jets of water out of the scuppers were no longer white, they were bright red! The washdown system was working! If the dye had been fallout, it was being hosed off the ship. As we rounded the stern and started back up the starboard side, I pointed out the red jets to the photographer to be sure he got some good pictures. Just as I did so, the helicopter motor sputtered and died. We began to windmill and lose altitude. The pilot cried "Mayday" in his mike and spoke rapidly to the ship. The fog generators stopped almost immediately. We fluttered around the bow of the ship as the washdown ceased. We were at the level of the bridge as we went by on the port side and I could see Mike and Woody looking at us. Aft, I could see sailors struggling to remove the sprinklers from the landing pad. We came over the rail a few feet up and plopped safely onto the pad. The pilot put the motor in gear and the rotor stopped. "Congratulations," I said to him, "I was worried about the barracudas in these waters." "That didn't worry me," he replied, "When you lose power on one of these, it usually catches fire." "I'm glad I didn't know that," I said and that was the truth.

That evening, *Worcester* anchored in Guantanamo Bay, not a trace of fuchsia on her paint. After chow, we boarded the captain's gig and were taken to the pier in front of the Officers Club. For the next few hours, we relaxed, drank martinis and toasted the success of our mission. Freddie spotted one of his classmates early on and went off with him. About midnight, we decided we had had enough. Mike went and collected Freddie, who was a bit under the weather by then. Down at the pier, we discovered that the *Worcester* liberty boat had just left, to be back in 15 minutes or so. We sat on the sea wall and watched the harbor activity. There were half a dozen navy boats, mostly captain's gigs, waiting off the pier. When a ship's captain emerged from the O Club, the coxswain on his gig would start up the engine and bring the gig to the pier with a flourish. This happened several times. Then, a commander came out of the club and walked carefully down to the pier. I recognized the officer as the buddy who had spent his evening with Freddie. A motor started up in the harbor and a gig began to move toward the pier. Freddie's friend, however, didn't seem to notice. He walked down to the pier and off the pier, his legs still striding as he hit the water. Fortunately, his gig was almost there and fished him out of the briny deep with a boathook. He went back to his ship more sober than Freddie.

Birth of the YAG

The success of the *Worcester* test got the attention of the admirals in the Bureau of Ships. The report of the ship's skipper was especially convincing. Freddie Ewing was rotated to other duty and a full Navy captain was brought in to take charge. Captain Molumphy was the equal of Mike Kearns and they drank together, plotted together and fought the good fight together. The main question raised by the admirals was whether the washdown would work on the broad deck of an

aircraft carrier. We found out the following year when we lined up eight fog generators across the bow of the aircraft carrier *Shangri La*, CV-38. The washdown worked like a charm.

But it was still just a dye that had been used in the tests. Would the washdown system really rid the ships of fallout and its deadly radiation? The admirals in CNO were reluctant to make the washdown a permanent part of the protective gear of the Navy without added proof of its value. After all, it would add more weight topside and we already were putting pig iron under the boilers to improve stability. They did agree to put temporary washdowns on all ships assigned to Joint Task Force Seven, the organization that supported the weapons tests at the Pacific Proving Ground. Those sprinklers were purely precautionary, however. They didn't intend that those ships be caught in fallout. If a ship were to be caught in fallout, we would have to do it on purpose—and that is what we did.

What we needed was a ship of our own—any old ship—that we could outfit with a washdown system and take to the Pacific Proving Grounds. That summer of 1953 word came that the weaponeers had tested a superbomb device as big as a house at Bikini and it had worked, producing not kilotons but megatons of explosive power. Plans were being laid for more tests the following year and we wanted to be part of them.

The Navy found a ship for us, a veteran Liberty ship of World War II. Its bow number was YAG-34. What is a YAG? The Navy has code letters it uses for various ship types: battleships are BBs, light cruisers are CLs, aircraft carriers are CVs. Noncombatant auxiliaries like transports have codes beginning with the letter A. Miscellaneous auxiliaries are AGs. Nonseagoing ships have codes beginning with Y, such as YFB for ferryboat. Now you know what a YAG is. Except, ours was seagoing, eventually.

As long as we were seeking radioactive fallout, the Lab wanted to gather data. Big sampling trays like doughnuts were installed on the masts high above the washdown system. Other instrumentation was included to measure radiation characteristics. Originally, I wanted the YAG to be operated by a crew buried deep within the ship, using compass and periscope to guide the ship. I was overruled. The YAG would be radio-controlled after a crew got her moving and then abandoned her.

Around September 1953, I was summoned back to Washington to help defend the YAG project before a technical review board set up by the Atomic Energy Commission (AEC.) The purpose of all nuclear weapons tests after Operation Crossroads was to help the laboratories at Los Alamos and Livermore build bigger and better nukes. We people on the defensive side of the business could participate only if the AEC approved. This hearing would be the final hurdle before the YAG project was approved.

On the day of the hearing, we walked from Main Navy, where the Bureau of Ships was now located, to the temporary (T) buildings on the mall that were built for World War II. In fact, we entered Building T-3, the very building that I had worked in during the war! The AEC, a postwar addition to the government, had inherited the temporary buildings. We met the review panel in a large meeting room on the second floor. I don't remember much about our presentation or even how many members of the review panel there were. What has stuck in my mind all these years is

the person who presided, a slim, almost gaunt, but instantly recognizable celebrity: Dr. J. Robert Oppenheimer.

Oppenheimer had led the successful project at Los Alamos to make the atomic bomb. He was acknowledged to be a brilliant physicist but he also was controversial because of his leftist leanings and because he had opposed the development of the H-bomb, in which he had no part. Now he was director of the Institute for Advanced Study at Princeton, where Einstein resided, and a consultant to the AEC. It was a fairly low estate, typified by listening to presentations by various defense groups such as ours but “Oppie” gave no hint of boredom and approved our proposal to chase fallout. Later, the AEC convened a security hearing on Oppenheimer while we were at Eniwetok in March of 1954 and shortly thereafter his “Q” clearance was revoked.

The YAG only made eleven knots so it was important to position her close to the expected fallout area before the explosion. Deciding where that was turned out to be my job. The Joint Task Force had meteorologists who had the job of predicting where the fallout would go as it was blown by the winds aloft but their concern was safety and we didn’t trust them. Moreover, the winds at both the Pacific Proving Grounds and the Nevada Proving Grounds were a problem. The prevailing winds at both were from west to east and eastward lay inhabited areas. The safest wind direction was from south to north in both locations. This only happened when a front was passing through. So delays in shot day were common. At Eniwetok, one sign posted said, FLEXIBLE TIME SPOKEN HERE. Because of the passage of a front, the wind direction at various altitudes tended to change almost by the hour. On top of this, the direction and speed of winds aloft to 100,000 feet was measured by radiosonde tracking of balloons released at a station some distance from shot point. Since it was usual for operational reasons to explode the test bomb around dawn, one usually was given wind data of the afternoon before. I educated myself on all this and invented some techniques of my own to try to improve my predictions.

In February of 1954, I flew to Eniwetok to participate in the YAG experiment as part of Operation Castle. The military flight first to Hawaii and then on to the Marshall Islands was an improvement over going there by sea as we had at Operation Crossroads eight years before. Nonetheless, the flight was so long and boring that I have never felt an urge to visit Australia or New Zealand since that experience. Not only that, on my arrival at our quarters on Parry Island, Eniwetok, Mike and Woody, who had nursed the YAG down there, informed me that a supply ship was delayed and there was neither gin nor vermouth on the atoll. What a way to start a project!

We got to business shortly. Shot Bravo was scheduled for early in March. About a week before, I started plotting the winds at both Eniwetok and Bikini every day. (The shot was to take place on Bikini and obliterate the island where we had drunk and swum eight years before.) The usual way to plot the winds was to draw an arrow in the direction of the lowest wind measurement (surface to 1,000 feet) and with length proportional to the wind speed. Then, another arrow, called a vector, was drawn beginning at the point of the first vector in the direction of the wind in the next altitude layer and with length proportional to its wind speed, and so on. The series of vectors would curve around like a snake, sometimes back on itself when there was much wind shear. After all were plotted, a straight line from the beginning to end point would indicate the direction from shot point to where the fallout from the highest altitude should fall. Of course,

what really would happen depended on how much radioactivity had been lifted to each altitude, how powerful the explosion was, and how stable the wind pattern was.

Most analyses assumed that the radioactive cloud was collocated with the visible cloud formed by the explosion at least until it stabilized and began to drift. I had consulted with people at NRDL who were the experts, particularly Dr. Carl F. Miller of the Chemical Technology Division. He taught me that not all the radioactivity was boosted into the nuclear cloud. Some was in the stem and some would start to rain out while the cloud was still rising and expanding. I also believed that the fallout would fall faster at very high altitudes where the air was thinnest and thus spend less time in the winds of those altitudes. Needless to say, we had had little experience, especially with the huge megaton explosions with which we were now dealing. So, I tended to draw several summation lines to various upper wind levels and note the curvature of the whole plot, which could indicate the potential width of the fallout pattern.

The night before the shot time, I plotted the most recent winds and discussed them with Kearns, Armstrong, and Captain Molumphy, comparing them to the wind data from 12 hours earlier. The vectors were curving from east to north and the summation lines had moved more easterly. There were Marshallese natives on Rongerik and Rongelap atolls several hundred miles east of Bikini. I didn't think the pattern would miss them to the north, especially if the winds moved more easterly overnight. Woody and I attended the 10 pm weather briefing and voiced our concern. The Air Force meteorologists poopooed our analysis and the decision was made to proceed in the countdown. We, however, moved the YAG to a position more easterly than previously intended.

Hunting the Wild YAG

Molumphy and Kearns had obtained a Navy patrol bomber, a P2V or some such, which they had outfitted with the gear to control the movement and monitor the conditions on the YAG by radio. We took off from the Eniwetok air strip at earliest light and headed east toward Bikini. We were to orbit south of the shot point and control the YAG from there. Once we were airborne, Woody proudly showed me the layout. Along one bulkhead of the rather large aircraft were complicated-looking racks of radio gear with Navy ratings seated before each. There also was a large plotting board that Molumphy ruled. Everyone had to have a job and one had been invented for me. I was their radsafe monitor. Woody showed me where the radiac instruments were stored. Since we didn't intend to encounter radioactivity, there wasn't anything to do so I drank coffee and watched the operation.

As the shot time countdown began, we crowded around the few ports to view the explosion. Also, there was a bombardier's glass house in the very nose of the plane, the pilot's position being behind a windshield higher up. I chose a port because I wanted to follow my Bikini procedure of turning my back on the flash. There was cloud cover around the shot point and we were 75 to 80 miles away but the eruption that occurred was spectacular, nevertheless. There was a double-peaked flash that lit up the cabin and I felt the same heat on the back of my neck that I had felt at Operation Crossroads; except that there I had been only 8 miles away and here we were 80 miles off. According to the cube-root law, this explosion must have been a thousand times more powerful than Crossroads Able. I turned and saw a great spherical fog screen formed behind the shock wave. The mushroom cloud rose up through this fog and climbed rapidly far

above us. It was trailing a roiling stem of dark material. The cloud began to expand when it reached the tropopause (about 80,000 feet at this latitude) and spread and spread and spread. We retreated to the southeast. All this occurred slowly and in total silence. My basic impression was “majestic.”

It was very difficult to judge the direction the visible cloud was moving but it seemed to be headed northeast. Soon, we had indications of fallout on the YAG. We had put it in the right place. The washdown was operating. We were in business. Hours went by. I ate a box lunch and had some more coffee. It was boring. Then, around noon, we “lost” the YAG. I didn’t know enough about the control system to understand much but apparently the monitoring returns from the YAG had been lost. Kearns could send an order to change course but we had no means now of knowing whether the YAG had received the message and changed course. After an hour of trying to solve the problem, Molumphy decided we would have to go in and find the YAG. If it was not where the plot said it should be, we had real trouble.

I went to the locker and picked out a T1-B radiac that appeared to work. We conferred with the pilot. I was to go out to the bombardier’s bubble and watch the needle as the plane flew northward. The pilot would avoid any visible clouds. If I detected radiation, I was to sing out and the pilot would promptly reverse course. I crawled out into the bubble. I sat in the bombardier’s seat, adjusted the headset to communicate with the pilot, and propped the T1-B between my knees. The bubble was a lonely place with a view in every direction, especially straight down. We were flying at about 5,000 feet. I could see the swell of the ocean waves marching off to the horizon. I glued my eyes on the dial of the radiac. It was on the lowest scale and wavered around the low end of the dial. It was reading the natural radiation from space, so I knew it was working.

We had been hunting for the YAG for about 20 minutes when suddenly the needle on the dial whipped over offscale. I shouted to the pilot as I changed scales. The plane banked to port as I went up scale by scale. Wow! I had never seen anything like it. The plane was now headed south. Shortly, the radiation level began to decrease and I downshifted scales. But I never got back to the lowest scale. We had never been in a visible cloud but now we were contaminated. We would live with this radiation all the way back to Eniwetok. I reported this to the pilot and Captain Molumphy. “OK, Jerry,” said Molumphy. “You had better come aft. We have a little problem back there.”

I crawled back out of the bubble and headed towards the tail section. I saw the chief radioman toweling off a young sailor. “What happened?” I demanded. “He was looking out the port,” said the chief. “You mean the port was open?” I cried. “Yes,” replied the chief. “What idiot agreed to that?” I asked. The chief looked at Mike Kearns. Kearns replied sheepishly, “We had to find the YAG.”

We hightailed it back to the base. Everyone who was contaminated went to the base hospital. The Army decontamination team got a lot of training on the aircraft. The rest of us went back to quarters, took a shower, and sat around drinking martinis and discussing the YAG results. We were interrupted by news of the fallout on the fleet.

The Real Thing

The July 23, 1954 issue of Collier's weekly magazine, which at the time had a tremendous national readership, had on its cover an artist's rendition of an aircraft carrier under full washdown steaming away from a huge nuclear cloud. Across the picture was a banner saying NAVY VS. THE H-BOMB How Shower Baths Saved Our Ships. Yes, you guessed it. The Navy had believed the Air Force meteorologists and an hour or two after the Castle Bravo explosion fallout began to fall on the task force support ships. The cover story by Bill Stapleton shows a full-page picture of the *Worcester* under full washdown from the starboard quarter. I swear it was the last picture we took before the helicopter conked out! Superposed on the picture were the words: The heretofore secret story of 10 warships that were unexpectedly trapped in deadly radioactive dust—but saved themselves with a shower of seawater. The ensuing story told how the support ships, which included the command ship *Estes*, the jeep aircraft carrier *Bairoko*, and the transport *Ainsworth*, were caught in the fallout area, sent their crews below, and turned on their temporarily installed washdown systems. After 10 to 12 hours of button-up, they were out of the fallout area and back in operation with radiation exposure well within the strict limit for the test operation. The washdown system had proved itself and the YAG was not really needed.

Actually, the fallout data from the YAG were very valuable and several YAGs were used in subsequent H-bomb tests primarily to gather fallout data. But one lesson had been learned. In the later operations, the YAGs were controlled by people on board deep in the ship, using compasses and periscopes. No more wild YAG hunting.

We savored the success of the washdown system in saving the Joint Task Force fleet for all of the next day. Then, on Day 3, we discussed what had happened on the YAG. The ship had been recovered. The washdown had indeed done its job well. But the sample collection pods at the tops of the masts were too "hot" to recover. The YAG must have been in the heaviest part of the fallout. It would be days before those samples could be recovered. That evening, Dr. Herbert "Pete" Scoville walked into our barracks and requested my services. "I have a job for him to help me with," said Pete. "It will take about a week." "OK," said Molumphy. After all, Pete Scoville was the Technical Director of AFSWP.